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STUDIES ON THE GENUS APHODIUS OF THE UNITED STATES AND CANADA (COLEOPTERA: SCARABAEIDAE): I. TWO NEW SPECIES FROM OREGON AND CALIFORNIA

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ABSTRACT—Two new species of *Aphodius* from the western United States are described. One of these species, *A.* **spermophili**, lives in the burrows of *Spermophilus beldingi* Merriam. The habitat of the other species, *A.* **perpolitus**, is not known.

This is the first of a proposed series of papers dealing with the genus *Aphodius* Illiger in the United States and Canada. The purpose of these papers is to make known information on the taxonomy, biology, and ecology of members of the genus, and to make it easier to identify them. There are presently many described species of *Aphodius*, but there are adequate keys to only a few small parts of the genus.

Horn (1887) produced the first comprehensive paper dealing with the genus *Aphodius* in North America. Nothing was done in the nature of a comprehensive treatment from 1887 to 1922 when Schmidt revised the Aphodiinae of the world. Schmidt described a few additional U.S. species and incorporated them in keys, but he did not add to or change Horn's classification to any degree except nomeclaturally.

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William J. Brown revised Horn's series I-b (1927), the subgenus *Platyderides* Schmidt (1928), and the subgenus *Diapterna* Horn (1929). In these papers Brown described several new species and made many changes in classification. With the publication of these papers it became possible, for the first time, to identify most North American specimens belonging in those groups. Hatch (1971) provided a key to the species of *Aphodius* occurring in the Pacific Northwest, this being the first comprehensive treatment of any consequence since Brown's papers.

Schmidt (1922) listed and gave a key to 74 subgenera of *Aphodius* for the world. Many of these include North American genera and it is usually possible to assign a species to a subgenus, but in my opinion many of these subgenera are not valid and others should be expanded, divided, or otherwise modified in order to be usable. The species in this and papers to follow are not assigned to subgenera, but the subgenus to which the species will go in Schmidt's key is indicated under remarks.

The present paper deals with 2 previously undescribed species from southern Oregon and northern California collected by Mr. Joe Schuh of Klamath Falls, Oregon. One of the species was collected from the burrows of *Spermophilus beldingi* Merriam (equals *Citellus beldingi*) and is a typical member of the subgenus *Platyderides*. The other has no host data and is probably not associated with a rodent burrow or nest.

Type material is deposited in the following collections: Joe Schuh collection, Klamath Falls, Oregon (JS); U.S. National Museum, Washington, D.C. (USNM); H. Howden collection, Ottawa, Canada (HH).

Thanks are due Henry Howden for taking the electron scanning photographs of the species herein described.

Aphodius spermophili Gordon, new species
fig. 1, 2, 5

Holotype: Male, length 5.65 mm, greatest width 2.60 mm. Form elongate, convex. Color reddish brown throughout. Head shining, posterior ¼ punctured, punctures nearly contiguous, anterior ¾ densely tuberculate, tubercles small, pointed; anterior margin of clypeus nearly truncate medially with sharp, upturned tooth on each side (fig. 2). Pronotum smooth, shining, punctures separated by the diameter of a puncture medially, becoming coarse and denser laterally; anterolateral angle abrupt, lateral margin explanate, feebly curved, posterolateral angle broadly rounded, concave internally, punctures becoming contiguous in concavity, posterior margin beaded, broadly rounded (fig. 1, 2). Elytron shining, punctures on intervals fine, arranged in 2 very irregular rows, striae distinctly impressed, intervals slightly convex. Ventral surface shining medially, alutaceous laterally; metasternum with irregularly scattered, coarse punctures medially.

1 2

3 4

Fig. 1 and 2, *Aphodius spermophili*: 1, head and pronotum, dorsal view; 2, head and pronotum, lateral view. Fig. 3 and 4, *A. perpolitus*: 3, habitus view; 4, head and pronotum, lateral view.

Anterior tibia with outer teeth strong, posterior tooth basad of middle of tibia, apical spur small, tapered from base to pointed apex; middle and hind tibiae with apex fringed with unequal spines, outer spur ⅔ the length of inner, bluntly pointed, inner spur longer than first tarsal segment, pointed. Anterior tarsus with basal segment shorter than segment 2, segments 2–4 subequal, fifth segment as long as segments 3 and 4 combined; middle and hind tarsi with basal segment nearly as long as 2 and 3 combined, segments 2–4 subequal, fifth segment 1½ times as long as fourth. Abdominal sterna finely punctured, alutaceous, punctures becoming coarser laterally. Genitalia as in figure 5.

Allotype: Female, length 5.80 mm, greatest width 2.80 mm. Not separable from male on external characters.

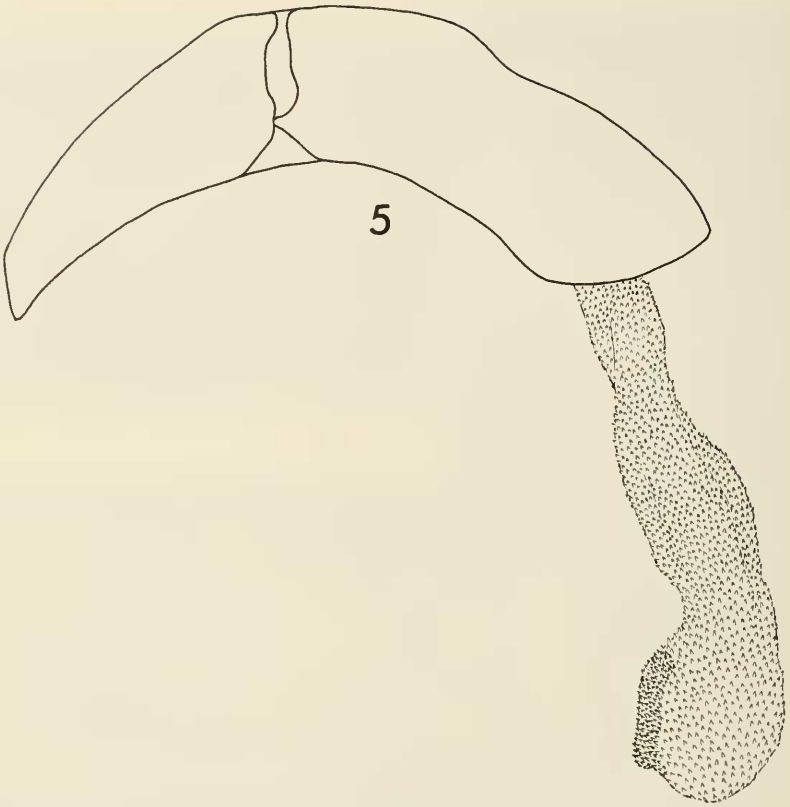

Fig. 5, *Aphodius spermophili*, male genitalia.

Type material: Holotype, male, California, Modoc Co., Saddle Blanket Flat, *Citellus beldingi* burrow, 5–10–71, Joe Schuh (USNM 72286). Allotype, female, same data as holotype (USNM). Paratypes, 49: 22 with same data as holotype; 27, California, Siskiyou Co., Macdoel, burrow of *Citellus beldingi*, May 17, 1971, Joe Schuh. (JS) (USNM) (HH).

Variation: Length ranges from 5.00 to 6.00 mm, width from 2.40 to 3.00 mm. The punctures in the posterolateral concavity of the pronotum are denser on some specimens than in figure 2, forming rows of elongate, contiguous punctures.

Remarks: *Aphodius spermophili* is very similar to *A. coquilletti* Linell at first glance and keys to that species in Brown (1928). *Aphodius coquilletti* has the head nearly smooth, tubercles (if present) only on the clypeus, the pronotum narrowed posteriorly, broadly explanate across the anterior angles and the posterolateral angle sinuately emar-

ginate. *Aphodius spermophili* has the head entirely tuberculate except the posterior ¼, the pronotum not narrowed posteriorly, narrowly explanate and not more so across the anterior angles and the posterolateral angle simply rounded, not emarginate.

Aphodius spermophili also resembles *A. militaris* LeConte superficially but *militaris* does not have an explanate pronotum and belongs in another group within the genus.

The type of *A. coquilletti* is USNM No. 560 bearing the following labels: "Los Angeles Co., Cal./Jan./3284/collection Coquillette/ Aphodius coquilletti Linell Type/Type No. 560 U.S.N.M.". Because Linell (1896) specifically stated that he had a single example from Los Angeles, California, this specimen must be considered the holotype of *coquilletti*.

Aphodius spermophili is a typical member of the subgenus *Platyderides* and, like all known members of this subgenus, is associated with a rodent. In this particular instance the rodent is *Spermophilus beldingi*, a common western ground squirrel.

Aphodius perpolitus Gordon, new species
fig. 3, 4

Holotype: Female, length 4.00 mm, greatest width 2.00 mm. Form elongate, oblong, sides of elytra parallel. Color black; legs and mouthparts reddish piceous; dorsal surface with faint greenish bronze sheen. Dorsal surface smooth, strongly shining except extreme apex of elytron roughly alutaceous. Head finely, evenly punctured, punctures separated by 1–3 times their diameter; anterior clypeal margin feebly, broadly emarginate medially, anterolateral angle broadly rounded (fig. 3). Pronotum finely, densely punctured medially, punctures separated by 2–3 times their diameter, punctures becoming slightly coarser and separated by their diameter or less toward lateral margin; anterolateral angle rounded, projecting forward, lateral margin nearly straight, indented slightly before posterior angle, appearing "pinched" (fig. 3), posterolateral angle abrupt, basal margin not beaded medially (fig. 4). Elytron with intervals flat, a row of very fine punctures on each side of interval near striae; striae distinctly, not deeply impressed. Ventral surface generally alutaceous; metasternum shining medially with a few coarse punctures present. Anterior tibia with apical spur long, robust, pointed, very slightly curved downward; middle and hind tibiae with short but apparently unequal spines, outer spur short, pointed, slightly sinuate, ⅔ as long as inner spur, inner spur longer than first tarsal segment. Anterior tarsus with first 4 segments subequal in length, fifth segment as long as 3 and 4 combined; middle and hind tarsi with first segment as long as 2 and 3 combined, segments 2–4 subequal in length, fifth segment nearly as long as 3 and 4 combined. Abdominal sterna strongly alutaceous, feebly, indistinctly punctured. Pygidium alutaceous, coarsely, densely punctured.

Type material: Holotype, male, Oregon, Klamath Co., Spring Creek, May 8, 1967, Joe Schuh (USNM 72287). Paratypes, 2, same data as holotype (JS).

Variation: Length ranges from 3.70 to 4.00 mm, width from 1.80 to 2.00 mm. One of the paratypes has a small, round, yellow spot on the fourth interval at the apical declivity of each elytron. The other paratype has a very obscure spot at the same location on one elytron, no spot visible on the other elytron.

Remarks: All 3 specimens in the type series are females. *Aphodius perpolitus* is difficult to place in Horn (1887) because the fringe of spines on the hind tibia is not clearly of equal or unequal spines. If it is assumed that they are unequal then it keys to *terminalis* Say, which is an eastern species having distinctly alutaceous elytra with a red elytral apex. If the choice of equal spines is taken, it keys to *alternatus* Horn, which does not have the sides of the pronotum indented and has the elytral intervals coarsely, densely, irregularly punctures. *Aphodius alternatus* also has the elytra in large part brown or yellow. In Hatch (1971), *perpolitus* keys to either the subgenus *Volinus* Mulsant or *Agrilinus* Mulsant but does not fit either very well. This is one of the species that points up the weakness of the subgeneric system used by Schmidt (1922). The extremely shining dorsum with greenish bronze sheen, indented lateral pronotal margin and each elytral interval with 2 rows of fine punctures distinguish *perpolitus* from any previously described species of *Aphodius*.

It is possible that the yellow elytral spots mentioned under variation above will prove to be more obvious and distinctive when additional specimens are found.

Figure 3, the habitus view of *perpolitus*, is somewhat distorted by the electron scanning microscope, something that not infrequently happens at magnifications of 8× to 10×. The specimen is actually shorter and more oblong than shown in the photograph but all characters other than shape are accurately represented.

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